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EXAMINER

DANIELS, MATTHEW J

ART UNIT

PAPER NUMBER

1732

DATE MAILED: 06/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, or by the Applicant's information disclosure statements, they have not been considered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1, 2, 5, 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Crump (USPN 5340433) in view of Tan (USPN 5142211). Crump teaches a method for three-dimensional modeling comprising heating a build chamber to an elevated temperature (15:20-52), dispensing modeling material from an outlet of a dispensing head onto a base provided in a build chamber (Fig. 1) and moving the dispensing head and the base in three-dimensions with respect to one another in synchrony with the dispersing of modeling material so as to build up a

three-dimensional object of predetermined shape on the base (16:17-68). Crump appears to be silent to maintaining physical and thermal separation between the heated build chamber and the gantry that controls motion of the dispensing head. However, these aspects would have been prima facie obvious over Tan, who teaches a method for controlling the movements of operating devices within a relatively large enclosure, which also includes a partition for maintaining physical and thermal separation between chamber and gantry (Figs. 1-10, for example). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Tan into that of Crump because Tan's apparatus beneficially prevents the escape of dust or other materials (3:60-68), and because Tan suggests the apparatus for any operation on a workpiece, and particularly for a coating method (1:5-12). One of ordinary skill would have recognized that Tan's enclosure could help maintain the temperature of the controlled environment of Crump. **As to Claim 2**, controlling motion of the base would have been obvious over Crump's teachings (16:17-38). **As to Claim 5**, Crump teaches that moving either of the dispensing head or base in any of the axes is possible (16:17-38). **As to Claim 6**, providing a feedstock material to an inlet external to the build chamber would have been prima facie obvious because Crump teaches a coil (Fig. 5) and the supply rod being inserted into the supply chamber (7:19-25).

3. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Crump (USPN 5340433) in view of Tan (USPN 5142211), and further in view of Anderson (USPN 3494853). Crump and Tan teach the subject matter of Claim 1 above under 35 USC 103(a). **As to Claim 3**, Crump and Tan are silent to physical and thermal separation for the base. However, Anderson

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teaches a method for maintaining physical and thermal separation between the build chamber and the lift that controls the base (Fig. 1). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Anderson into that of Crump and Tan because doing so provides the ability to maintain a substantially unbroken or controllably modified condition throughout the entire operation (2:1-12).

4. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over Crump (USPN 5340433) in view of Tan (USPN 5142211). [^] *further in view of Gore (USPN 5,257,657).* Crump and Tan teach the subject matter of Claim 1 above under 35 USC 103(a). **As to Claim 4**, Crump and Tan are silent to the claimed limitations. However, Gore teaches that either the layered material or the lower bead can be heated and controlled within well-defined temperature ranges to avoid weak bond formation (5:10-24). Gore additionally teaches that the equilibrium temperature is preferably only slightly below the solidification temperature of the liquid-phase material for objects that are built up rapidly (6:42-45). Because Gore additionally teaches depositing tin (6:65), which melts at approximately 232 degrees C, it would have been obvious to one practicing the combined method that in order to deposit tin, a build chamber temperature greater than 200 degrees C would be needed in order to provide an equilibrium temperature only slightly below the solidification temperature in order to maximize the build speed (6:42-45). Additionally, Crump's teachings ((15:20-52)) and Gore's teachings (5:10-24) teaches that the temperature of the layered materials, and therefore the chamber that contains them, represents a result-effective variable that can be optimized. See MPEP 2144.05 II and *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). It would have been prima facie obvious to one of ordinary skill in the

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art at the time of the invention to incorporate the method of Gore into that of Crump and Tan, and optimize chamber temperature, in order to minimize voids and avoid weak joint or bond formation and stress between layers.

5. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Crump (USPN 5340433) in view of Tan (USPN 5142211), and further in view of Reiss (USPN 5581994) and Beeston (USPN 3472452). Crump and Tan teach the subject matter of Claim 1 above under 35 USC 103(a). **As to Claim 7**, although Crump teaches fins which would inherently direct flow of air, Crump and Tan appear to be silent to the claimed limitations. However, Beeston teaches a chamber heated by convection such that an air flow pattern is created in the chamber (Fig. 1, arrows 72 and 70). Reiss teaches a method for cooling a thermally loaded component by deflecting an air flow pattern towards the thermally loaded component (1:5-17). Crump teaches that control of the temperature around the dispensing head and guide tube is achieved by providing conditioned air to the area by means of a conduit (13:50-54). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the methods of Reiss and Beeston into that of Crump and Tan in order to a) provide temperature control of the area around the dispensing head by providing a conduit (Crump 13:50-54), b) provide a constant temperature inside an enclosure while the outside temperature varies at random (Beeston 1:26-30), and c) cool the thermally loaded component by deflecting an air flow pattern towards the thermally loaded component (Reiss 1:5-17).

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6. **Claims 8, 11, 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Crump (USPN 5340433) in view of Tan (USPN 5142211) and Anderson (USPN 3494853). **As to Claim 8**, Crump teaches a method for three-dimensional modeling comprising heating a build chamber to an elevated temperature (15:20-52), dispensing modeling material from an outlet of a dispensing head onto a base provided in a build chamber (Fig. 1) and moving the dispensing head and the base in three-dimensions with respect to one another in synchrony with the dispersing of modeling material so as to build up a three-dimensional object of predetermined shape on the base (16:17-68). Crump teaches motion control components (Items 36 and 38 in Fig. 11), but appears to be silent to their relation to the build chamber. However, Tan teaches isolation of head motion control components from the chamber (Figs. 1-10) and Anderson teaches isolation of base motion control components from a chamber (Fig.). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the methods of Tan and Anderson into that of Crump in order to because doing so provides the ability to maintain a substantially unbroken or controllably modified condition throughout the entire operation (Anderson, 2:1-12), and because Tan's apparatus beneficially prevents the escape of dust or other materials (Tan, 3:60-68), and because Tan suggests the apparatus for any operation on a workpiece, and particularly for a coating method (1:5-12). One of ordinary skill would have recognized that these enclosures could help maintain the temperature of the controlled environment of Crump. **As to Claim 11**, Crump teaches that moving either of the dispensing head or base in any of the axes is possible (16:17-38). Tan (Figs. 1-10) and Anderson (Fig. 1) also teach these aspects. **As to Claim 12**, providing a feedstock material to an inlet

external to the build chamber would have been prima facie obvious because Crump teaches a coil (Fig. 5) and the supply rod being inserted into the supply chamber (7:19-25).

7. **Claim 9 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Crump (USPN 5340433) in view of Tan (USPN 5142211) and Anderson (USPN 3494853), and further in view of Gore (USPN 5257657). Crump, Tan and Anderson teach the subject matter of Claim 8 above under 35 USC 103(a). **As to Claims 9 and 10**, Crump, Tan, and Anderson are silent to the particular limitations. However, Gore teaches that either the layered material or the lower bead can be heated and controlled within well-defined temperature ranges to avoid weak bond formation (5:10-24). Gore additionally teaches that the equilibrium temperature is preferably only slightly below the solidification temperature of the liquid-phase material for objects that are built up rapidly (6:42-45). Because Gore additionally teaches depositing tin (6:65), which melts at approximately 232 degrees C, it would have been obvious to one practicing the combined method that in order to deposit tin, a build chamber temperature greater than 150 degrees C or 200 degrees C would be needed in order to provide an equilibrium temperature only slightly below the solidification temperature in order to maximize the build speed (6:42-45).

Additionally, Crump's teachings ((15:20-52)) and Gore's teachings (5:10-24) teaches that the temperature of the layered materials, and therefore the chamber that contains them, represents a result-effective variable that can be optimized. See MPEP 2144.05 II and *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Gore into that of Crump and Tan, and optimize chamber temperature, in order to minimize voids and avoid weak joint or

bond formation and stress between layers. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Gore into that of Crump, Tan, and Anderson in order to minimize voids and avoid weak joint or bond formation and stress between layers.

8. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Crump (USPN 5340433) in view of Tan (USPN 5142211) and Anderson (USPN 3494853), and further in view of Reiss (USPN 5581994) and Beeston (USPN 3472452). Crump, Tan, and Anderson teach the subject matter of Claim 8 above under 35 USC 103(a). **As to Claim 13**, although Crump teaches fins which would inherently direct flow of air, Crump and Tan appear to be silent to the claimed limitations. However, Beeston teaches a chamber heated by convection such that an air flow pattern is created in the chamber (Fig. 1, arrows 72 and 70). Reiss teaches a method for cooling a thermally loaded component by deflecting an air flow pattern towards the thermally loaded component (1:5-17). Crump teaches that control of the temperature around the dispensing head and guide tube is achieved by providing conditioned air to the area by means of a conduit (13:50-54). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the methods of Reiss and Beeston into that of Crump, Tan, and Anderson in order to a) provide temperature control of the area around the dispensing head by providing a conduit (Crump 13:50-54), b) provide a constant temperature inside an enclosure while the outside temperature varies at random (Beeston 1:26-30), and c) cool the thermally loaded component by deflecting an air flow pattern towards the thermally loaded component (Reiss 1:5-17).

9. **Claim 14, 17, 18, and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Crump (USPN 5340433) in view of Tan (USPN 5142211) and Anderson (USPN 3494853). **As to Claim 14**, Crump teaches a method for three-dimensional modeling comprising heating a build chamber to an elevated temperature (15:21-52) dispensing modeling material from an outlet of a dispensing head onto a base provided in a build chamber (Fig. 1) and moving the dispensing head and the base in three-dimensions with respect to one another in synchrony with the dispersing of modeling material so as to build up a three-dimensional object of predetermined shape on the base (16:17-68). Crump teaches motion control components (Items 36 and 38 in Fig. 11), but appears to be silent to their relation to the build chamber and to the deformable thermal insulator. However, Tan teaches isolation of head motion control components from the chamber (Figs. 1-10) by a deformable thermal insulator (3:60-68) and Anderson teaches isolation of base motion control components from a chamber (Fig.). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the methods of Tan and Anderson into that of Crump in order to because doing so provides the ability to maintain a substantially unbroken or controllably modified condition throughout the entire operation (Anderson, 2:1-12), and because Tan's apparatus beneficially prevents the escape of dust or other materials (Tan, 3:60-68), and because Tan suggests the apparatus for any operation on a workpiece, and particularly for a coating method (1:5-12). One of ordinary skill would have recognized that these enclosures could help maintain the temperature of the controlled environment of Crump. **As to Claim 17**, Crump teaches that moving either of the dispensing head or base in any of the axes is possible (16:17-68). Tan and Anderson also appear to teach

these aspects. **As to Claim 18**, providing a feedstock material to an inlet external to the build chamber would have been prima facie obvious because Crump teaches a coil (Fig. 5) and the supply rod being inserted into the supply chamber (7:19-25). **As to Claim 20**, the Examiner takes the position that this is an apparatus limitation that does not materially affect the claimed method, and therefore is not given patentable consideration in the claimed method. However, Anderson (Fig. 2, Item 56) and Tan (Fig. 8, Item 21a) teach deformable insulators that can be considered to be baffles.

10. **Claim 15 and 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Crump (USPN 5340433) in view of Tan (USPN 5142211) and Anderson (USPN 3494853), and further in view of Gore (USPN 5257657). Crump, Tan, and Anderson teach the subject matter of Claim 14 above under 35 USC 103(a). **As to Claims 15 and 16**, Crump, Tan, and Anderson are silent to the particular limitations. However, Gore teaches that either the layered material or the lower bead can be heated and controlled within well-defined temperature ranges to avoid weak bond formation (5:10-24). Gore additionally teaches that the equilibrium temperature is preferably only slightly below the solidification temperature of the liquid-phase material for objects that are built up rapidly (6:42-45). Because Gore additionally teaches depositing tin (6:65), which melts at approximately 232 degrees C, it would have been obvious to one practicing the combined method that in order to deposit tin, a build chamber temperature greater than 150 degrees C or 200 degrees C would be needed in order to provide an equilibrium temperature only slightly below the solidification temperature in order to maximize the build speed (6:42-45). Additionally, Crump's teachings ((15:20-52)) and Gore's teachings (5:10-24) teaches that the

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temperature of the layered materials, and therefore the chamber that contains them, represents a result-effective variable that can be optimized. See MPEP 2144.05 II and *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Gore into that of Crump and Tan, and optimize chamber temperature, in order to minimize voids and avoid weak joint or bond formation and stress between layers. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Gore into that of Crump, Tan, and Anderson in order to minimize voids and avoid weak joint or bond formation and stress between layers.

11. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over Crump (USPN 5340433) in view of Tan (USPN 5142211) and Anderson (USPN 3494853), and further in view of Caugherty (USPN 2117651). Crump, Tan, and Anderson teach the subject matter of Claim 14 above under 35 USC 103(a). **As to Claim 19**, Crump, Tan, and Anderson appear to be silent to the claimed limitation. However, it would have been prima facie obvious over Caugherty because Caugherty teaches removing a buildup of material from a cylindrical rod by driving the cylindrical rod against a rotating member of a cleaning assembly (Fig. 2). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Caugherty into that of Crump, Tan, and Anderson in order to completely loosen scale on the rod-like extrusion heads of Crump (Fig. 5).

Response to Arguments

12. Applicant's arguments filed 30 March 2006 have been fully considered but they are not persuasive. The arguments appear to be on the following grounds:

- a) There is no suggestion for the combination of Tan and Crump
- b) Tan's belt does not extend across the entire opening of the chamber
- c) The Crump patent does not teach or suggest maintaining thermal separation between a heated build chamber and gantry that controls motion of the dispensing head and the base member. The Crump patent requires carriage rods to be physically located within the controlled environment
- d) The preferred temperature inside the cabinet of Crump would eliminate the need to maintain a physical and thermal separation. As such, there is no teaching or suggestion for any benefits from such an arrangement as proposed by Claim 1.
- e) Claims 2-7 are not particularly argued.
- f) Crump discloses the mechanisms for controlling motion of dispensing head and base member remain within the controlled environment. The motion control components referenced by the Office Action are Crump's computer and keyboard. However, these components do not include at least one rail that defines an axis of movement for a dispensing head, as required by Claim 8.
- g) Tan does not disclose or suggest maintaining thermal isolation between the external motion control components, as required by Claim 8.
- h) Anderson does not disclose or suggest thermal isolation between the motion control components and the build chamber. The Anderson patent is directed to a sputtering system, and while the sputtering system includes a substrate support that is movable in X-Y-Z planes, the movable substrate is not a gantry system that controls motion of the dispensing head.

- i) Claims 9-13 are not particularly argued.
- j) Tan does not teach or suggest the deformable thermal insulator because Tan's belt does not thermally insulate.
- k) The Anderson patent does not disclose the motion control components for the head.

13. These arguments are not persuasive for the following reasons:

a, c, d) Tan suggests the method and apparatus for use with a device which produces operations such as coating in an enclosure (1:5-13). The Examiner asserts that Tan clearly recognizes that the invention has broad applicability, directed specifically to at least one coating process. The Examiner asserts that Tan's suggestion is valid. It is also argued that the Crump patent requires the carriage rods to be physically located within the controlled environment. The Examiner respectfully disagrees. The Examiner asserts that Crump requires only the dispensing head to be inside the chamber, but does not appear require that the carriage rods are also placed inside that environment. There appears to be no teaching away from the combination. Crump clearly requires a controlled temperature chamber, and the Examiner asserts that Tan's belt would have been an obvious device for achieving that result.

b, g, j) It is argued that Tan's belt does not provide thermal isolation. The Examiner respectfully disagrees, and points to Tan's teaching at 3:60-67 where it is taught that the top of the cabinet is closed off ("close off") to "prevent" escape. The picture shown in the Applicant's remarks does not show the cabinet (denoted as item 3 in Tan's Fig. 2), and thus does not appear to fully represent the relationship between the cabinet and Tan's device. The text clearly shows that Tan intends the barrier to "close off" the top of the cabinet.

It should also be noted that Applicant's arguments appear to be directed primarily at *apparatus* limitations. The Applicant's specification appears to disclose that the particular apparatus produces an increased life of the motion control components. However, it is unclear how either the particular apparatus or the beneficial result disclosed materially affect the claimed "method for three-dimensional modeling" or the product that results. While Crump appears to be silent to some of the apparatus limitations of the claims, Crump's method and apparatus provide all the limitations of the independent claims directed at the "method for three-dimensional modeling", namely the heating of a build chamber, dispensing of modeling material, and moving of the dispensing head and base.

e) Claims 2-7 are not particularly argued.

f) The Examiner asserts that there is no teaching away from the combination. Crump only appears to require the head be placed inside the chamber. External devices which control either a head in multiple dimensions or a base in multiple dimensions are not new, as cited in the rejection of Claim 8. Tran clearly teaches the rail, and suggests the apparatus for performing any operation, such as coating, on a workpiece (1:5-12).

h, k) In its broadest reasonable interpretation, Anderson's apparatus is a coating apparatus. Both Tan and Crump teach coating, and this aspect does not appear to distinguish the invention. It is unclear how Applicant's arguments assert that Anderson's device does not teach thermal isolation. Anderson's device obviously has feedthroughs (Fig. 2, for example) that provide thermal isolation. The arguments directed against the reference to Anderson for its asserted lack of a dispensing head on a gantry are noted. However, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references

individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The recited and argued elements are found in the other references.

i) Claims 9-13 are not particularly argued.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Daniels whose telephone number is (571) 272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJD 6/10/06


CHRISTINA JOHNSON
PRIMARY EXAMINER
6/10/06